

# PATENT SPECIFICATION

419,166

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## COMPLETE SPECIFICATION.

### Improvements in or relating to Springs.

We, UUNO MÄKELIN, and HEIKKI ILMARI NIEMELÄINEN, both Finnish Citizens, and both of 6, Bulevarden, Helsingfors, Finland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this invention is to provide a spring that can be used for all purposes for which an ordinary plate or leaf spring has hitherto been used. Plate springs have the disadvantage that they are liable to breakage, their lubrication involves difficulties in the case of, for example, automobile springs and their action is for many purposes not sufficiently elastic. The hardening also of plate springs is difficult for a non-skilled person. All these drawbacks are much reduced or avoided by the spring according to this invention which can be used equally well as an automobile spring as for any other purposes for which plate springs are required. Tests have proved that an automobile spring made according to this invention is about 8 to 10 times as solid as the ordinary automobile spring composed of plate springs.

The spring according to the invention is characterised by a combination of a number of steel wires of uniform thickness and circular cross-section forming separate spring elements which are formed into a bundle, the wires being arranged in horizontal rows in direct contact with one another with the centres of the wires in each horizontal row at any point along the length of the bundle lying in a straight line, the bundle forming in cross-section a rectangle and being compressed to form a unit by metal bands in such manner that the individual wires are not allowed a relative lateral movement but are each independently arranged so that the ends of the wires may move freely lengthwise in relation to the wires in the top or bottom row of the bundle, whichever is attached to the vehicle, the separate wires being prevented from moving as a whole or loosening from the bundle by a centrally arranged metal band or number of bands which tightly clamps

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the bundle.

The ends of the top or bottom row of the bundle are attached by suitable means to the vehicle. This attachment may be made, for example, by bending the ends of the wires in the particular row to form an eye through which a bolt may be passed.

The spring may be attached to the vehicle by means of a plate spring or springs which is placed next to the top or bottom row of wires according to the way the spring is to be fitted.

The accompanying drawing shows a perspective view illustrating the construction of a spring according to the invention.

The wire elements 1 are arranged in superposed rows and held together by metal bands 2. The central band 3 clamps the elements together to prevent movement as a whole or in a manner to loosen the bundle. The ends of the elements in the row 4 are bent over to form an eyelet 5.

The use of the spring is, naturally, not limited to automobiles, but may likewise be used in railway carriages, tramcars, carts and the like and generally for all purposes where plate springs are now used. The principal purpose of the invention is to obtain an exceedingly strong and solid spring that may be successfully used everywhere where strength and solidity are required without attaching special attention to the usage of the material. Breakage of this spring is practically impossible and the elasticity of the same is greater than that of any ordinary plate spring. Lubrication is easy, because the lubricant is well kept in the furrows between the wire springs. Further, the wire springs are readily hardened before they are combined into the composite spring so that no final hardening will be required.

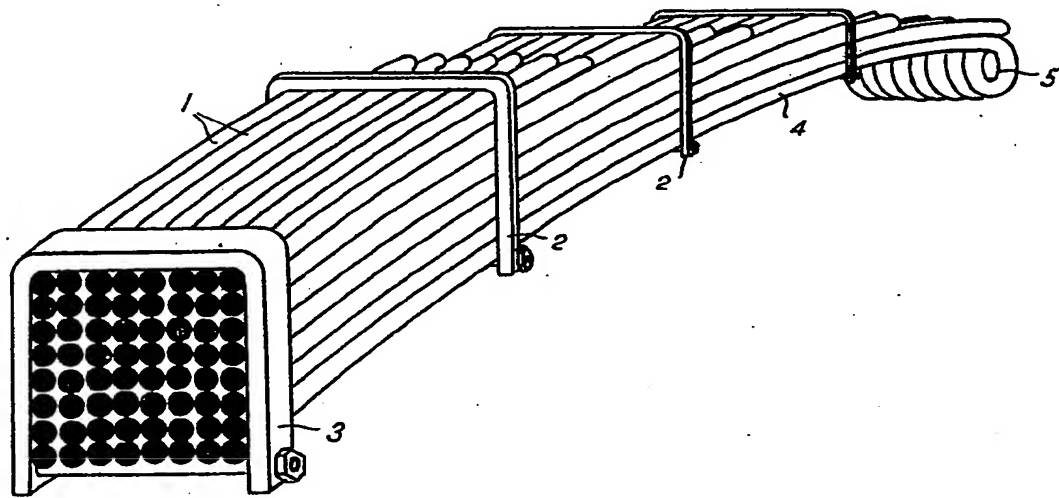
Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A spring for vehicles, characterised by a combination of a number of steel

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- wires of uniform thickness and circular cross-section forming separate spring elements which are formed into a bundle, the wires being arranged in horizontal rows in direct contact with one another with the centres of the wires in each horizontal row at any point along the length of the bundle lying in a straight line, the bundle forming in cross-section a rectangle and being compressed to form a unit by metal bands in such manner that the individual wires are not allowed a relative lateral movement but are each independently arranged so that the ends of the wires may move freely lengthwise in relation to the wires in the top or bottom row of the bundle, whichever is attached to the vehicle, the separate wires being prevented from moving as a whole or loosening from the bundle by a centrally arranged metal band or number of bands which tightly clamps the bundle. 20
2. A spring as claimed in Claim 1, characterised in that one or more plate springs is employed next to the top or bottom row of the bundle for attachment to the vehicle. 25
3. A spring for vehicles, substantially as described with reference to the accompanying drawing. 30
- Dated this 8th day of November, 1933.
- ABEL & IMRAY,  
Agents for the Applicants.
- Reference has been directed, in pursuance of Section 7, Sub-section (4), of the Patents and Designs Acts, 1907 to 1932, to Specifications No. 204,710 and 159,333.

[This Drawing is a reproduction of the Original on a reduced scale.]



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